



# The CAN Bus

Every new truck and bus sold in Australia now has a digital communication bus called a CAN bus. This allows messaging between the many different microcomputers (also called ECMs) that now exist on most heavy vehicles. Service tools might be able to read the messages, so it is important to know what the CAN bus is and where to access it. This article describes the CAN bus and reviews the service tools that are available in Australia to access it. CAN means Controlled Area Network. It was developed by German-based Robert Bosch GmbH and described at the Detroit SAE conference in 1986. Clearly Bosch hoped that CAN would become an international standard for vehicles. CAN communication chips were first released by Intel and Phillips in 1987. Bosch published the CAN 2.0 specification in 1991. Twenty-one years later, the Bosch vision has been achieved. CAN is now used in Australia on European, Japanese and North American trucks. The key feature of a CAN bus is that it allows controllers (ECMs) to be added or removed without set-up. It is the CAN communication protocol that is built into each ECM communication module that sorts out conflicts, issues transmission requests and interprets the messages. Further information is given in the Box 1 below.

It is probably true that every new Australian truck and bus has at least one 'public' CAN bus. However, there are significant differences between models originating on different continents. Trucks will probably also have a low-speed bus that is used

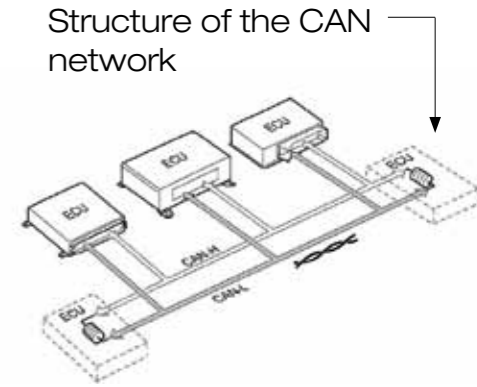
for instrumentation. This operates according to another standard (SAE J1708). Trailers also have a CAN bus if a Trailer EBS system is installed. The CAN bus is accessible at the 7-pin EBS electrical connector at the front of the trailer.

## Key features of a CAN bus

- The hardware consists of twisted-pair (or shielded) wires labelled CAN\_H and CAN\_L.
- A transmitted bit is dominant if the voltage on CAN\_H is greater than that on CAN\_L by 0.9V. Vehicle earth is not involved, so the CAN bus is immune from earth-system noise which significantly improves noise immunity. The twisting or shielding is also done to improve noise immunity.
- Unused breakout points ('nodes') should be terminated with 120 Ω resistors to minimize reflections.
- The signal between the two wires is either 24V (European vehicles) or 12V (North American vehicles).
- Communication speed is typically 250 kB/s for a heavy vehicle. Slower buses may be used for instrumentation.
- There is no master communication module. All modules are capable of sending and receiving on the CAN bus.
- The ECMs on connected to the bus can either transmit a message or request that a particular message be transmitted.
- The CAN has a 'content-oriented addressing protocol' that makes it very flexible. This means the message could be generated by any ECM and it is the protocol rather than the ECM that determines behaviour.
- The identifier identifies the type of message its protocol. The identifier has 21 bits. The 'payload' follows and can be up to a maximum of 8 characters.
- Transmission requests are handled by their importance to the system. Each transmitting ECM checks whether the bus is in use and waits if its message is of lower status.
- Error correcting features are included so that ECMs will know whether the received message is corrupted.

The first and most important difference is that the CAN operates at 24V on European and Japanese trucks and 12V on North American and Australian made trucks. Only 'multi-volt' devices can read both levels. These devices usually assume that the CAN will be at the same voltage level as the power supply level because the standards that apply specify that this should be so. Because the Trailer EBS systems that are in the Australian marketplace have a European orientation, the CAN message format is based upon the international standard ISO 11898 (CAN 2.0b). This describes the message structure. ECM manufacturers decide what messages are relevant to their ECMs. The other data format standard that

is used on heavy vehicles in Australia is described in SAE standard J1939, which is used on North American made equipment. The J1939 and ISO 11898 standards are generally compatible if the communication can be made to work at the same Bus voltage level. Box 2 provides an example of a 'workhorse data message' for engine data that is routinely broadcast from a North American engine. Other messages are routinely broadcast and some messages are broadcast when a request comes from another ECM. The CAN bus is available at several 'public' locations on a truck or trailer (that has Trailer EBS). North American trucks have a seven pin round (Deutsch) connector under the instrument console



that contains the public CAN together with ignition power and earth. European trucks have had mandated CAN connections (since 2004) called EOBD. The connection is usually a 16-pin two-row type (see Box 3). Trucks with an intelligent electronic brake system should have a seven-pin round brake connector that contains the CAN\_L and CAN\_H wires. The connectors are specified in the Australian Design Rules (35 & 38) and must comply with ISO 7368-1 (24V) or -2 (12V). Over the past twelve months, hardware has become available in the Australian market that is intended for connection with the CAN bus. Firstly, adaptors are now available that allow communication between 12V and 24V CANs. These adaptors allow trucks and trailers to communication irrespective of voltage. General-purpose service tools that are multi-volt and can be used on European, Japanese and North American trucks are not yet available here, but these can be expected over the next 12 months. It should be possible for a workshop to have a computer that can listen to or interrogate any ECM that is on the public truck CAN bus.

Peter Hart  
ARTSA CEO

### Electronic Engine Controller #1 - EEC1

Transmission rate	Engine speed dependent
Data length	8 bytes
Data page	0
PDU format	240
PDU specific	4
Default priority	3
PGN	61,444 (0x00F004)
Byte : 1	Status_EEC1
Bits: 8-5	Not defined
Bits: 4-1	Engine / retarder torque mode
	0000: Low idle governor/no request (default mode)
	0001: Accelerator pedal/operator selection
	0010: Cruise control
	0011: PTO governor
	0100: Road speed governor
	0101: ASR control
	0110: Transmission control
	0111: ABS control
	1000: Torque limiting
	1001: High speed governor
	1010: Braking system
	1011: Remote accelerator - N/A
	1100: Not defined
	1101: Not defined
	1110: Other
	1111: Not available
Byte : 2	Drivers demand engine - pet torque
	Resolution: 1% / Bit, - 125% offset
Byte : 3	Actual engine - percent torque
	Resolution: 1% / Bit, - 125% offset
Byte : 4,5	Engine Speed
	Resolution: 0.125 rpm / Bit, 0 rpm offset
Bytes: 6-8	Not defined



NEIL CHAMBERS

## What is the State of Health in the Transport Industry?

good health. To assist employers, there is a range of information material on healthy lifestyle choices, and grants are available to fund health and wellbeing activities for workers. Such initiatives aim to help improve lifestyle habits, including:

- Providing quit smoking support;
- Implementing healthy catering options – this could be as simple as providing a basket of free daily fresh fruit and vegetables for staff; and
- Developing health and wellbeing policies for companies.

Once initial WorkHealth checks are done, individuals who want additional support can take advantage of further free and confidential WorkHealth Coach advice by telephone. This is especially important for workers who are at enhanced risk of developing type 2 diabetes or heart disease.

You may think that all of this is nice, but not a priority for your business. Unfortunately, the statistics should convince you otherwise!

Since 2002, WorkHealth checks have been conducted for over 50,000 workers in Victoria, with over 8,300 of these checks being in the transport and warehousing sector. Unfortunately, our industry is up the top of the league ladder for all the wrong reasons:

- 95% of workers reported that they don't eat enough fruit or vegetables;
- 7 out of 10 workers reported physical activity levels below the recommended level (30 minutes of moderate activity each day);
- Half of males and a third of females reported alcohol consumption at

higher than recommended levels (more than two standard drinks per day);

- A quarter of workers in the transport and warehousing sector are smokers, compared to only 18 per cent across the Victorian workforce generally;
- One in three males and one in seven females have high blood pressure, and a quarter have high blood glucose and cholesterol levels;
- Two in five males and one fifth of females were assessed as having a high risk of developing type 2 diabetes, while 7% of workers in our industry have a high risk of developing heart disease.

There is a lot of talk about where the future workforce for the growing transport & logistics industry will come from, and how the necessary skills will be developed to ensure that productivity is maintained, let alone go backwards. These are key issues, but what about the health of our existing workforce? The figures above should be a salutary reminder to us all that the productivity, profitability, safety and sustainability of the transport & logistics industry are in the hands of a workforce that could clearly be healthier than it currently is. What are you going to do about this? For a start, check out the information on [www.workhealth.vic.gov.au](http://www.workhealth.vic.gov.au) – it might just head you down a healthier path.

Neil Chambers  
CEO  
VTA

**T**he Victorian Transport Association, along with our waste division, the Victorian Waste Management Association, conducted a series of successful Breakfast Workshops in September and October in seven regional centres across Victoria, from Mildura and Shepparton, through to Ballarat and Warrnambool. We travelled some miles, but it was satisfying to speak to operators and freight generators, large and small, about their employment, human resources, health and training issues.

Joining us in each regional centre have been local community health specialists who provide professional services to WorkSafe Victoria under the Victorian WorkHealth Program.

The WorkHealth Program provides free and confidential work health checks in the workplace, as well as supporting businesses and individuals to achieve better health outcomes.

The WorkHealth professionals arrange to complete work health checks at a time and a place to suit your business and your workforce. In the transport & logistics industry this includes getting to yards in the wee hours to consult with drivers before the start of their shift! The WorkHealth checks often spark conversations in workplaces about what businesses can do to encourage



GEOFF CROUCH

## NatRoad Conference delivers strong policy agenda

consultation processes between the road transport industry and the National Heavy Vehicle Regulator to:

- guide the transition process;
- establish an on-going dialogue on regulatory matters; and
- to support the progression of the Forward Work Program including future reform proposals.

I am pleased to report that NatRoad immediately wrote to the Queensland Premier and Transport Minister encouraging the safe passage of the Bill which at the time of writing this article Bill 2 is about to be introduced and hopefully passed. This support was also conveyed to all Federal and State/Territory Transport Ministers.

### Industrial Relations

NatRoad's legal and industrial structure was a hot topic with delegates unanimously supporting a NatRoad application to Fair Work Australia to become a registered industrial organization representing the interests of employers.

The ever-changing industrial landscape, most notably, the introduction of the Road Safety Remuneration Act 2012 has been the catalyst for this move.

### Immigration:

I reported in the July 2012 edition that 'driver shortages are crippling heavy vehicle productivity' and this was also supported by Conference delegates who endorsed the pursuance by NatRoad of a Template Labour Agreement with the Federal Department of Immigration and Citizenship for the Australian road freight transport sector to allow operators the option of sourcing overseas truck drivers and plant operators to fill domestic labour shortages.

I am also pleased to report that NatRoad

has held a number of positive meetings with the Federal Department of Immigration and Citizenship and 'pilot work' has now commenced to determine if a Template Labour Agreement is possible.

### Carbon Tax

Delegates reaffirmed their opposition to the Carbon Tax, which has already proved to be a major cost impost on some carriers. Most notable was refrigeration, and this provided a very robust discussion with some positive and exciting outcomes.

As many readers would be aware, the Australian Government has endorsed a 'Carbon Farming Initiative' to allow farmers the ability to offset the impact of the carbon tax through various mitigation measures. Similarly, NatRoad, whilst it will continue to oppose the carbon tax on heavy vehicles from 1 July 2014, has resolved to investigate the development of a Road Freight Carbon Initiative that enables operators to be credited for offset measures they undertake, and to have the ability to trade in recognized carbon credits as an alternative to paying the carbon tax.

### Liquid and Dry Bulk Carriers

Several resolutions were adopted at the Liquid and Dry Bulk Carriers meeting including:

- that NatRoad liaise with co-operative bulk handling companies with the aim of incorporating legislated mass adjustments into grain receipt standards;
- that NatRoad investigate options to resolve load rejections at grain receipt points in a timely manner.

### Load Restraint:

A resolution was also passed that

**T**he 2012 NatRoad Conference delivered on its promise of a strong 'grass roots' policy agenda to ensure the interests of road transport operators were being heard and addressed across Australia.

In a new format that delivered the floor to the delegates through the hosting of specialized breakout sessions, organized by carrier type, and a lengthy and robust Parliamentary Session, 20 resolutions were adopted at this Conference.

The issues are wide ranging and I am pleased to provide a summary of the major developments which will have a significant impact on the road transport policy agenda for the next 12 months.

### National Heavy Vehicle Regulator:

Delegates unanimously supported the passage of the first Heavy Vehicle National Law Bill through the Queensland Parliament and the establishment of a National Heavy Vehicle Regulator with limited operational capacity from 1 January 2013. This support was however conditional including:

- Calls for full operational capacity to be delayed until the amending bill has been passed in Queensland, and the consolidated law has been adopted in at least NSW, VIC and SA;
- Calls for Transport Ministers to make a specific commitment to resourcing the Forward Work Program;
- Calls for the establishment of formal



STUART ST CLAIR

## TruckWeek shows Australia

Lisa Sharwood presented her research on the danger of sleep apnoea to Australia's commercial truck drivers.

The ATA NSW BBQ breakfasts at Port Botany proved very popular with truck drivers, with 1,500 sausages and 25 kilograms of bacon cooked over the course of TruckWeek.

Celebrity sausage sizzlers appearing during the week included NSW Minister for Roads and Ports Duncan Gay, ATA NSW Manager Jill Lewis, CEO and Director of Sydney Ports Grant Gilfillan and RMS General Manager Compliance Paul Endycott.

Meanwhile, the ATA's safety accreditation program, TruckSafe, together with ATA member association Natroad, conducted the regional NSW launch of TruckWeek in Dubbo with local Mayor Mathew Dickerson.

TruckWeek was also supported by a national media campaign, thanks to road safety ads placed by NatRoad. Even the Australian Federal Police gave their support to TruckWeek, with a media release calling for other road users to show consideration to heavy vehicles.

Traffic Operations Sergeant Rod Anderson said it was a collective responsibility for road users to be courteous and look out for each other.

"From a police perspective, we view heavy vehicle drivers as generally safe and law-abiding; as professional drivers, their livelihood depends on it," he said. But it wasn't just the big end of town taking part in TruckWeek. Across

Australia, trucking operators and suppliers joined the festivities with community BBQs, TruckWeek discounts and toolbox talks to name a few. The Alice Springs Road Transport Historical Society celebrated TruckWeek with a lunchtime BBQ during their annual Truckies ReUnion, featuring unique outback dishes such as camel curry.

Cleary Bros, the 2012 winner of the John Kelly TruckSafe award, recognised 38 long serving staff with a TruckWeek award ceremony and afternoon BBQ. Two awards really stood out: John Tate celebrated 41 years with the company, while Brian Stewart has been with them for 48 years.

The last event for TruckWeek 2012 was held by Lindsay Transport at Coffs Harbour, where the showground was transformed for a trucking family day out. With face painting, a jumping castle, local suppliers, a free BBQ and plenty of trucks on show, this event really did have something for everyone. These were just a few of the events that took place during TruckWeek 2012. I'd like to thank every individual and organisation, large or small that took the time to be part of the week. The next national TruckWeek will take place in 2014. To see a full list of the events that took place over the week, go to [www.truckweek.com.au](http://www.truckweek.com.au).

Stuart St Clair  
Chief Executive  
Australian Trucking Association

**T**he festivities of TruckWeek 2012 have come to an end, after spreading word of our industry and its achievements across Australia.

The week-long celebration of our industry ran from 19-25 August, with events taking place in every state and territory.

Run by the ATA every two years, TruckWeek's aim is to show Australia how trucking delivers. TruckWeek 2012 brought all sectors of the industry together to highlight our achievements and showcase what a safe, professional trucking industry can do.

In Canberra, ATA Chairman David Simon led a delegation program where trucking industry leaders travelled to Parliament House to meet politicians and discuss issues facing the industry. The delegation met with political leaders including the leader of the Opposition, Tony Abbott, and the Minister for Infrastructure and Transport, Anthony Albanese.

These meetings gave our industry leaders the opportunity to inform federal politicians about the trucking industry's concerns.

The ATA also hosted a breakfast for politicians where Australian researcher



PHIL TAYLOR

## Implications for trucks in the business tax review

years instead of 7.5 years. Should the current effective life cap be removed, the most likely outcome is that this alone would be a strong disincentive for operators of older trucks to modernise their vehicles. TIC has long recognised that some operators struggle to have the means to upgrade their fleets to new trucks, even if they recognise the safety, environmental and productivity benefits that can be achieved with late model vehicles. To address this, TIC has promoted a range of incentives that would encourage the uptake of newer trucks, including that of an investment allowance or accelerated depreciation for owners. An investment allowance worked very well in 2009-10 following the Global Financial Crisis. Unfortunately, removing the effective life cap for trucks would almost certainly have exactly the opposite effect of an investment allowance, and would have the unintended consequence of further increasing the average age of the truck fleet.

This age issue has created a problem for the federal Government in that it does not assist the Government to meet its stated objectives in terms of the environment (reducing emissions), road safety (reducing crashes, deaths and injury), and the economy in terms of improved productivity. Late model trucks are fitted with advanced environmental and safety features that were not available to trucks built just a few years ago. The impact of removing the capped effective life provision based upon an inappropriate practical definition of effective life for a heavy vehicle, would adversely affect the already high average national fleet age and therefore the Government's environmental, safety and productivity objectives.

In addition to sending the average age of the truck fleet in the wrong direction,

truck sales in Australia would reduce negatively, affecting manufacturing plants at Bayswater (Kenworth); Dandenong (IVECO) and Wacol (Volvo / Mack) as well as the operations of importers who contribute significantly to the Australian economy through employment and product offering.

Another possible change to the business tax system may involve winding back Research & Development tax incentives. TIC's member companies conduct the majority of R&D activities in Australia to develop compliance with new or revised Australian Design Rules (ADRs). These ADRs focus upon vehicle safety and improved environmental performance. The resultant benefits to the community-at-large are experienced through reduced health costs which arise from poor air quality and reduced injury and fatality costs through improved vehicle safety. Accordingly it is reasonable that some Australian truck suppliers would avail themselves of an R&D tax incentive to offset some of these Government imposed local R&D costs. If the R&D tax incentives cease to be available some manufacturers would conduct a higher proportion of R&D activities offshore. This could result in trucks being less suitable for the operational and climatic extremes only experienced in Australia, as well as making the newer vehicles more costly as the full R&D expense needs to be amortised over every vehicle sold.

In conclusion, the headline looks great: lower business tax rate. However, the small print would show that there's "no such thing as a free lunch". Indeed, the trade-offs that could be recommended to government may result in an older, less productive, less safe transport fleet, while increasing the cost of new vehicles.

Phil Taylor, President

**T**he Federal Government, through its Department of Treasury, has begun a review of the business tax system, with a view to possibly reducing the business tax headline rate (currently 30 per cent). While this, on the surface, seems like a good thing for all businesses, there is a catch. The massive pressures on the Federal Budget to remain in surplus are such that the tax revenue losses from a lower business tax rate have to be recouped from savings elsewhere. Relevant to truck suppliers and operators, these savings may come from changes to the capital equipment depreciation rates. Further, savings may also come from a reduction of the Research and Development incentives that are currently available. The Business Tax Working Group has written a discussion paper on the matter. The attention of the Truck Industry Council has been drawn to the Working Group's consideration of measures that "broaden the business tax base". In particular, one proposal suggested is to remove the "effective life cap" for depreciating a new truck. The current cap is 7.5 years, and yet even with that figure in place, the average truck fleet age is still fast approaching 14 years. Both truck suppliers and operators would be negatively impacted if they were required to depreciate a new truck over, say 15

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